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THE NATIONAL ASSOCIATION OF COST ACCOUNTANTS
NEW YORK CITY

N. A. C. A. BULLETIN

Vol. XIX, No. 14 March 15, 1938

IN TWO SECTIONS

Section I

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This Bulletin is published semi-monthly by the National Association of Cost Accountants, 385 Madison Avenue, New York. Subscription price, $10.00 per year. Entered at the Post Office, New York, N. Y., as second-class matter August 28, 1925, under the Act of March 3, 1879.

EDITORIAL DEPARTMENT NOTE

We are deviating a little from our usual practice in this issue of the Bulletin. Usually we attempt to have the two or three articles in a single Bulletin relate to a single subject. The two articles in this issue refer to different subjects, but both relate to the practices of a single company, or rather, a single division of one of our largest companies, the Inland Manufacturing Division of General Motors Corporation. While on different subjects, the papers tend to supplement each other, and we believe our readers will be interested, among other things, in the organization setup revealed by the combined articles. A consideration of the functions of the different departments in cost control and estimating will reveal the thought which has been given in this organization to giving those who have most control over an activity the responsibility for performance of that activity. We suggest that his point be kept in mind in reading these two articles.

Our first article, dealing with the control of manufacturing costs with emphasis on methods of reporting and uses made of cost control data, is the joint product of M. A. Lause and F. A. Boettger. M. A. Lause was educated in the Dayton, Ohio, schools and was graduated from college in 1918. His introduction to industrial life was with the Reynolds and Reynolds Co., manufacturing stationers and printers. He became connected with the General Motors Corp. in 1920, in the cost department of the Dayton Wright Co., manufacturers of airplane bodies. In July, 1923, he entered the accounting department of the Inland Manufacturing Division of the General Motors Corp., remaining as Auditor until 1928, at which time he was transferred to the manufacturing division of the Company as Head of the Standards Department. At the present time he holds the position of Assistant Factory Manager. He is a charter member and a Past President of Dayton Chapter, N. A. C. A., and is on the Board of Directors of the Dayton Foreman's Club.

F. A. Boettger is a native of Cincinnati, Ohio, and was educated in the schools of that city, graduating in 1926 from the University of Cincinnati, with the degree of Commercial Engineer. Manufacturing and clerical experience followed in positions with the Methodist Book Concern of Cincinnati and the Newport Rolling Mill Co. of Newport, Ky. In June, 1928, he entered the employ of the Inland Manufacturing Division of General Motors Corp., in the cost department. In 1930, he was placed in charge of the factory accounting department, and has served in that capacity to date. He became a member of Dayton Chapter, N. A. C. A. in 1928 and is serving as President of the Chapter for the current year.

J. C. White, author of our second article, was graduated in Mechanical Engineering from Cornell University in 1930. Following graduation he entered the Inland Manufacturing Division of General Motors Corp. as an industrial training course student. At the completion of this course Mr. White joined the standards department to work on cost control and labor estimating. Since 1935 he has been Head of the Estimating Department.

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NATIONAL ASSOCIATION OF
COST ACCOUNTANTS

MARCH 15, 1938

PRESENTATION AND USE OF COST CONTROL DATA

By M. A. Lause, Assistant Factory Manager, and
F. A. Boettger, In Charge, Factory Accounting Department,
Inland Manufacturing Division, General Motors Corp.,
Dayton, Oho

THE SUBJECT of this joint paper is one that every cost accountant deals with every day and on which every one has his own personal ideas. It is our intention to present the subject of cost control only as it is actually operated in our organization. Since we are presenting here the entire field of cost control as exemplified in our company, it is not possible to go into the details of each element of control.

Our company, the Inland Manufacturing Division, General Motors Corporation, is a manufacturer of rubber and metal products for the automotive and electrical refrigeration industries. We manufacture approximately five hundred different items which are in current production, and several thousand others which we are called upon to make from time to time. We employ approximately 3,100 people in our plant.

The products which are manufactured consist of certain major lines of products, such as automotive steering wheels, running boards, weather strips, antennae, electric refrigerator ice trays, and also a miscellaneous line of small rubber products. Our plant is so organized that these major lines of product are manufactured in separate departments. This setup permits of more accurate burden costing on the individual lines of product and also better control. We have found that methods which can be used on certain phases of our production cannot be used on others. For this reason we have established, as a general rule, separate types of control for the various lines of product and, in fact, more or less treat the plant as a group of individual plants. In other words, no effort is made to have one system of cost control into which it is attempted to force all the various kinds of products which are manufactured.

This paper is presented in two sections, since that is the manner in which the cost control method operates. There are two separate and distinct steps in the cost control activity. The accounting divi-

sion collects all the data and prepares all the reports in connection with the various cost controls which are used. The standards department, a part of the manufacturing division, establishes the standards against which performance is measured, utilizes the accounting department information and does the actual administrative work in the cost control program.

The true test of the effectiveness of a cost control program is in actually controlled cost, and not in the issuance of pretty, accurate, and scientifically developed cost reports. Some of the most important cost reductions that have been made have been the result of reports or letters which were very poor from an accountant's standpoint, but which carried across the necessary information and secured the action that many a more elaborately designed program would not have secured.

It has been found in our organization, and I believe it is true in a good many other organizations, that a good bit of the cost accountant's effectiveness is lost due to the fact that the other department heads resent the apparent attempt on the part of the cost accountant to tell them how to run their departments. A cost report, no matter how informative or well presented, has no value unless used. To circumvent this attitude we have the standards department, which is in the same division as the department foreman, administer the cost control program, and have found that there is a far more co-operative spirit when this is done than when the cost department itself tries to point out various excessive costs.

We attempt to control all the major elements of our costs in two ways. We have reports that are submitted at regular intervals which measure the cost performance but, in addition to this, we also put out other more specific and detailed reports covering any particular situation which may be out of line. These supplementary reports have been a very important factor in our cost control program because they point out very specifically the bad spots, and do it in such a manner that they attract attention, which the regular weekly report does not do. Most busy executives tend to give less and less attention to regular operating reports with the result that, in a good many cases, important information contained in the report is overlooked by the executive. If, however, this report is supplemented by another report or letter calling specific attention to this condition, there is a much better chance of securing action. Fol-

lowing is a brief description of major cost control activities, supplemented by some sample reports, which are shown following the text.

Indirect Expense Cost Control

In our control of indirect expense we prepare a daily statement of the total manufacturing expense for the plant by major accounts which is compared with the plant standards. This report is issued daily to the General Manager and to the Executive Vice President of General Motors at Detroit. Exhibit "A" shows a sample of this report. I might state here that these exhibits were based on hypothetical figures and only serve to help explain the operation of the cost control. The standards shown on Exhibit "A" are established at the beginning of the car model year and are approved by the executive offices. This daily plant report is an important factor in measuring the performance of the various divisions in the General Motors Corporation.

To carry this indirect expense control down to the individual departments there are standards set up for each department. These standards do not include all elements of expense, eliminating such items as depreciation, taxes, scrap, power, postage, etc., which are things over which the foreman has no control and, in some cases, no knowledge of. Weekly we issue a statement of the manufacturing expense by departments to the individual departmental foreman. Exhibit "B" shows a sample of this report. In cases of individual departments, we submit to them daily a statement of certain of their indirect expenses, these items being requested by the foreman and approved by the budget man, so that we can be certain that the data we compile will actually be used. Supplementing this, we issue daily a report showing the amount of idle time cost by causes and by departments (Exhibit "C"). You will note the report is detailed by causes and compared with standard in total only. This is done because this element of indirect cost is a very important one in our type of operation and one which is controlled only by close detailed observation on the part of every department head.

Direct Labor Cost Control

Direct labor is controlled daily by a comparison of the standard labor cost of producing the day's products as compared with the

actual cost of production. The standard labor costs of production were determined in the beginning of the year, and, as a rule, are in line with the estimated cost on which we based our selling price for the product in question. These standards then become our measuring stick against which we compare our performance daily and issue a weekly report by departments. The Daily Plant Report, Exhibit "A", carries the performance on this element of cost as well as the indirect expense. (See the lower section of Exhibit "A".) You will note that the savings of burden and productive labor are added together. This is done because in many instances savings in one is made at the expense of the other, but by adding them together the true net saving is shown.

Scrap and Rework Cost Control

Scrap and reoperations are controlled weekly on a strict responsibility basis. Each scrap ticket is signed by the department head responsible for the scrap which is then charged against his department. A weekly report is issued showing departmental performance compared with standard (Exhibit "D"). A more detailed explanation of this control can be found in the 1935 Year Book[1], which gives a very complete description of our control of this type of expense. In addition to the responsibility reports which are issued weekly we put out supplementary reports daily on any product or class of product which may be showing an excessive scrap or reoperation cost (Exhibit "E").

Direct Material Usage Cost Control

On the usage of productive materials we issue weekly reports comparing the actual consumption of these productive materials with scientifically established standards (Exhibit "F"). Separate reports are put out for the various lines of product. The amount of rubber compound actually used in the manufacture of the individual products is determined and compared with the amount of rubber compound which should have been used in the manufacture of that number of pieces, based on the standards established. This gives the foreman and the standards department an excellent measuring stick on one of the most variable elements of cost in our industry. A monthly summary is issued for the management by class of products (Exhibit "G").

[1] *N. A. C. A. Year Book, 1935.* "Control of Spoilage and Material Usage." M. A. Lause. pp. 107-130.

Direct Material Price Control

Rubber compound costs are also controlled. Here, however, the control is centered not in the manufacturing division but in the engineering division which is responsible for the development of the rubber compounds used in our manufacturing processes. It might be stated that it is not easy to enthuse an engineering department about cost control. However, it is believed that our engineering department has given a good bit of thought to this problem since we have established this control and have placed graphic charts in the office of the chief chemist. (Exhibit "H").

Special Tool Cost Control

In the control of tool costs, we have instituted a job order cost control to see that the tool itself does not run beyond our estimated costs, and, second, we have established a control to see that the production capacity of the tool is completely utilized. The tools in our industry consist largely of rubber molds in which the product is vulcanized. To control the utilization of these molds it is necessary that we control the length of time that the product has to be in the mold to complete the curing process, and that we see that the mold is being operated the full amount of time available. A great many variable conditions can effect the productivity of our molds such as the length of cure, the cycling of the cure time with the length of time to change the molds, the number of cavities run in the mold, the relation of the mold size to the press platen size, etc. This control does not measure efficiency on each of these scores but it does measure the overall performance which is the main thing our management is interested in. (Exhibit "I").

This gives a brief idea of the major items in our cost control program and examples of the reports which are used. The next part of the job is to use these reports and accomplish the results that justify the clerical expense involved.

Cost Control Administration Within the Manufacturing Division

It is the purpose of the balance of the paper to explain, in a brief way, the use we make of this cost data and how we attempt to administer the control of costs within the manufacturing division of the plant through the use of the cost information that is supplied. Emphasis must be placed on the importance we attach to our pres-

ent setup for cost control administration, and to tell something of the preparations we made to change the attitude of the shop towards cost information generally. Our cost department has always furnished a wealth of cost data, and of recent years the cost information submitted has been more comprehensive and more understandable, even to the layman. A number of years ago it become evident, that with all the cost information we were furnishing, we were not doing a very good job of cost control, principally because the cost information was not properly understood and interpreted by the department heads to whom it was sent. As a preparation for proper cost control administration we established, within the manufacturing division, and reporting to the factory manager, the standards department, whose sole job became the setting up of standards, the interpretation of cost data and control of costs within the manufacturing division itself.

Gradually, through the educational procedure set up by this department, our foremen and department supervisors began to be more cost conscious and where they had formerly looked on the cost data as criticisms of our division by another division of the plant, they now began to interpret this cost information and its administration as an aid to them in the operation of their departments. In other words, they began to look at the problem of producing the product—getting out the schedule, as the term goes—and to be cognizant of the fact that the foreman is the department manager and is expected not only to make the schedule, but to produce that schedule economically and profitably. The establishment of the cost control function as a department of the manufacturing division itself, to my mind, has done more to make cost reductions possible than any other single factor.

Using our standards department, then, as a cost interpreter, we are attempting to administer the control of the following costs in the manufacturing division:

1. Direct labor
2. Direct material usage
3. Scrap and reworked costs
4. Indirect expense

It is not possible, within the confines of this paper, to explain in complete detail the procedures we follow in the administration

of the control of these cost elements, but a short outline of methods for each type of cost will be given.

Direct Labor Cost Control

A. Estimate—The first tangible information we have about the labor cost of any job is, of course, the estimate of the labor cost that is prepared prior to the quotation of the job.

B. Estimated Routing—If we are fortunate enough or unfortunate enough, as the case may be, to get the job, the labor estimate is reviewed in the light of any revisions of the manufacturing methods that are made at the time of tooling and equipping the job as its production is planned. This revised estimate of the labor cost is issued to the department heads and foremen involved, on what we know as an "Estimated Routing" which lists the operations in sequence and their estimated cost, and describes the tools and equipment that will be used in the process. Our labor control section and the foremen involved use this estimated routing as the preliminary budget at which to shoot.

C. Forecast—After the job has been in production a short time so that our labor control section and process and methods department can study it in detail, a new forecast is made and this forecast, furnished to both the cost department and the department heads and foremen involved, becomes the standard with which we measure our actual labor performance on any job. In the standards department itself, comparisons are kept up to date of the actual labor cost in comparison with these forecasts and we attempt to take prompt action immediately any unfavorable variances show up. To give you some idea of how our performance is running for the budget period August, 1936 through April 20, 1937, our direct labor costs have been slightly over 4 per cent lower than our budget.

Direct Material Usage Control

Our material usage control operates almost the same way as does our direct labor, starting out with the estimated material consumption as shown by the original estimate and using that as a standard until the job has started and a new and more scientific standard can be developed. Our material control personnel in the

standards department, works with the Technical Control Laboratory and with the general foreman in the plant and establishes a normal standard of usage on each product. Comparisons are made, from week to week, of the actual performance with these predetermined standards on each class of product, and records are kept of the variances. Each department's performance in this regard is reviewed in a cost meeting held weekly, at which time the records and charts of each department's performance are reviewed.

Scrap and Rework Cost Control

Our methods of controlling scrap and reoperation costs were presented in a rather detailed manner in the 1935 Year Book. We will give here only a brief resumé of the methods outlined in detail in that paper. Under our method, a scrap ticket is written up for any quantity of product scrapped for any cause. The scrap control section of the standards department fixes the responsibility for any product scrapped and the foreman of the department responsible admits this responsibility by signing the scrap ticket.

The priced scrap tickets serve as the basis for a weekly scrap report prepared by the cost department. This report is delivered to the standards department where we keep a record of performance by departments, and also keep up to date a series of charts of each department's actual performance in relation to the standards. Charts and records are reviewed in a weekly cost meeting. The unique part of our scrap control plan is that we measure scrap cost in relation to direct labor, by departments and in total, and so record and chart the performance. It is worthy of note that starting with 1930 our scrap cost per direct labor dollar has been in successive years $.524, dropping to $.188 in 1931, the first year of control, to $.135 in 1932, $.106 in 1933, $.112 in 1934, $.114 in 1935, $.113 in 1936 and $.126 to date in 1937. Our standard for 1937 was established at $.10, and while we are, therefore, in rather bad shape according to our standard in 1937, we are certainly in a very advantageous position in comparison with our performance before we had control, or with our performance during the first two years of control.

Indirect Expense

We also maintain, in the standards department, an indirect expense control function, in which we record, from the information

submitted by the cost department, the performance of each department and chart that performance for presentation and review at the weekly cost meeting. Our standards of performance of indirect expense are, like scrap and reoperation, measured in terms of direct labor performance and standards are established for each classification of indirect expense under the following headings:

1. Indirect labor
2. Supplies
3. Perishable tools
4. Maintenance labor
5. Maintenance material
6. Losses (idle time, etc.)
7. Miscellaneous charges

You will note that we do not hold the department foreman responsible for charges for power of any kind, nor for fixed charges, but limit his responsibility for expense to those items following readily under his specific supervision. We keep records and charts of the expense performance of each department, in total and under the detail classification just mentioned, and we do the same thing for the manufacturing division as a whole.

The Reviewing Meeting

As mentioned before, we hold a cost meeting each week, at which time we review the performance of each department. These meetings are attended by all the general foremen and department heads and are presided at by the factory manager or assistant factory manager. The method of procedure is, first, to review the division's performance with regard to any element of cost, and after the review of the total performance of the division, we take up the performance of each department. If the performance of the division, as a whole, is good, our usual procedure is to point out the performance of those who contributed to this favorable performance. On the other hand, if the performance of the division, as a whole, is bad, the departmental review is one of criticism of those who have caused the "fall-down." Obviously, this puts the foreman who has failed to meet his standard, "on the spot" before his fellow foremen and, since he does not like to be put in this position, he really tries to avoid it by improving his department performance, which is exactly the purpose of the control plan. We try to

work out with the foremen at these meetings any problems he may have; he is permitted to state his side of the case and from the discussion in these meetings, frequently come the suggestions and plans that make for cost betterment.

If you will refer to Exhibit "J," you will note there the record of the scrap and reoperation performance of our miscellaneous rubber and metal parts molding department. Prior to last August 1 we established a standard of $.11 per dollar of direct labor and you will note that our accumulative performance to date has been $.093. We have spent $6,046.00 for scrap and reoperation against our standard of $7,168.00, or we are running $1,122.00 better than standard in this department. The $.096 figure in the left column indicates our accumulative performance from August 1 up to February 1, so that from February 1 to date in April we have made some additional improvement. A similar chart is prepared for each department and, as I said, reviewed each week at the cost reviewing meeting.

Exhibit "K" indicates our performance in material usage control in our steering wheel department. I should have mentioned previously that our material control function does not extend itself to every item of direct material. A great many of our stampings and castings are purchased and we confine our material usage control job to the usage of materials processed in our own plant. You will note from the chart that the accumulative performance on our steering wheels shows that against a standard of $163,812.00 we have actually used $164,860.00 worth of compound, or our compound usage was $1,048.00 over the standard from August 1 last to date. In spite of our being $1,048.00 over standard, however, we have used $3,006.00 less of material for the volume produced than was used before we established the control. A like chart is prepared for each class of product of our manufacture and these charts are reviewed weekly.

On Exhibit "L", Indirect Expense, we see the performance not of any department but of the manufacturing division, as a whole, for the period August 1, 1936 to date. We are operating, as you will note on the chart, at 94.4 per cent of the standard; or, on a standard of $936,504.00 we have actually spent $884,415.00, and have accumulated a favorable variance of $52,009.00.

For all items under control, direct labor, direct material, ex-

pense, scrap and reoperation, our performance since last August 1 is $130,000.00 under our standards on approximately $4,000,000.00 worth of controllable expense, or a little over 3 per cent under standard. The present actual performance as compared with performance prior to the institution of the control is many times that savings. The savings in scrap and reoperation performance alone in comparison with the cost we had before control would amount to $200,000.00 annually, and, I should say that very conservatively, our attempts at control of all items of cost are resulting in at least a half million dollars under our experience before the control was instituted.

Cost Control Vitalizes Foremen's Jobs

I want to emphasize the point that many of us too often wait to begin the control of costs until some really complete method of procedure has been established, with the result that months, perhaps years, of uncontrolled costs go by while we are waiting for that procedure to be completed and polished and put into final shape. Our practice has been, just as soon as the need becomes apparent for the control of any cost on any job, to start right in, with whatever method is available at that time. We feel that any method, however crude, comes nearer controlling the cost than no method at all, and we work with this crude method and get at least some control of the cost while the final polished method is being developed.

In answer to the question that must arise in your minds as to the foreman's reaction to our cost control methods, I can only say that our foremen are more interested in their jobs now than they ever were. We think we have made the old orthodox production foreman in our plant a department manager who is cost conscious and operates his department pretty much as if it were a business of his own. We make him a part of our standard setting. He assists its preparation and is in agreement that it is possible of accomplishment before it becomes effective. Therefore, he feels a greater responsibility to meet the standard after it does become effective. He feels he is a more important cog in the operation of the business and he is pleased with the new method. It goes without saying that the management is pleased with it and that we are going to continue it and enlarge the scope of its activities.

GM 37
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EXHIBIT "A"

DAILY PLANT REPORT

GENERAL MOTORS CORPORATION

INLAND MFG. DIVISION

PLANT _____

DATE February 9, 1937

	TODAY					MONTH TO DATE		
	TOTAL BURDEN	DEDUCT FIXED	ACTUAL VARIABLE	STANDARD VARIABLE	SAVING	SAVING	VARIABLE RATE ACTUAL	VARIABLE RATE STANDARD
INDIRECT LABOR	4,459	972	3,487	3,362	-125	-634	40	38
OPER. SUPPLIES	661	0	661	973	312	215	10	11
TOOLS	117	0	117	177	60	115	2	2
POWER	1,079	257	822	1,062	240	769	10	12
MAINTENANCE–LABOR	734	30	704	885	181	607	8	10
" MATERIAL	184	19	165	619	454	1,554	3	7
LOSSES	1,169	0	1,169	973	-196	-57	11	11
FIXED CHARGES	1,086	949	137	177	40	141	2	2
MISCELLANEOUS	-12	99	-111	266	377	826	0	3
TOTALS–BURDEN	9,477	2,326	7,151	8,494	1,343	3,536	86	96

	TODAY	MO. TO DATE	YR. TO DATE
ACTUAL PROD. LABOR	8,250	32,932	701,130
STD. PROD. LABOR	8,848	35,366	721,025
SAVING–LABOR	598	2,434	19,895
SAVING–BURDEN	1,343	3,536	-16,341
TOTAL SAVING	1,941	5,970	1,554
OVERTIME PREMIUMS PAID			

DATE ISSUED Feb. 10, 1937 TIME ISSUED 3:00 PM

SIGNED BY _____
PLANT MANAGER

EXHIBIT "B"

Inland Division

OPERATING REPORT SUMMARY

Department #23 - Tool Room Foreman Mr. John Smith Date Issued 4/23/37

Classification of Expense	Week Ending 4/17/37			Period 4/4/37 Thru 4/17/37			4/2/36 Thru 4/3/37		
	Actual	Standard	Saving	Actual	Standard	Saving	Actual	Standard	Saving
Indirect Labor	552.	584.	32.	1032.	1123.	91.	17740.	15148.	-2592.
Supplies	74.	100.	26.	149.	190.	41.	2836.	2577.	-259.
Tools	257.	320.	63.	338.	609.	275.	9003.	7607.	-1396.
Maint. Labor	77.	229.	152.	122.	436.	314.	3209.	5441.	2232.
Maint. Material	131.	201.	70.	210.	383.	173.	6018.	4781.	-1237.
Losses	0.	5.	5.	0.	10.	10.	45.	130.	85.
Miscellaneous	10.	46.	36.	17.	88.	71.	626.	1093.	467.
Total Expense	1101.	1485.	384.	1868.	2839.	975.	39477.	36577.	-2900.
Std. Budget Direct Labor	67538.			128567.			1605701.		

Fixed Expense 120.24 Plus Variable Expense (.02021 = $ 67538. D.L.) $ 1364.94 = $ 1485.18

Total Departmental Expense Charged to Div. Budget	123.	123.	1192.

Remarks

Form 413 Rev.

Factory Accounting Dept. Per

EXHIBIT "C"

INLAND DIVISION

REPORT OF MANUFACTURING DELAYS

Date Issued 4/23/37
Today Period Covered 4/9/37
To Date Period Covered 4/3 thru 4/9/37

DEPARTMENT #3 - Misc. Vulcanize

CAUSE	Today	To Date
Insufficient Setup	21.46	96.10
Setup Jobs		
Rearrange Lines	.46	7.60
Start and Warmup		23.68
Change Molds	.09	.63
Clean Molds	10.82	55.96
Repair Molds	13.14	85.86
Repair Tools		
Repair Equipment (Maintenance)	7.49	34.40
Repair Equipment (Tool Room)	.09	.09
No Stock Scheduled		3.71
No Stock Prepared	11.39	49.14
No Stock Delivered	3.24	15.74
Bad Stock	7.31	25.96
No Inserts	.54	37.37
No Plated Parts	1.30	2.66
Traffic Delays		
Tests, Tryouts, Etc.	.46	1.46
Missing Cavities	31.08	135.51
Power Off		192.12
Miscellaneous	.55	11.65

	Today	To Date		Today	To Date
Standard			TOTAL	109.42	779.90
Direct Labor	1191.42	5546.66	Standard	154.12	717.78
Var. Rate Per Direct Labor $	.12936		Var. from Standard	44.70	-62.12

Hot Weather Relief		
Standard Fixed Amount		
Var. from Standard		
Actual Variable Rate per Direct Labor Dollar	.09184	.14056

REMARKS:

Form No. 417—L. Div.—

Factory Accounting Department

EXHIBIT "D"

SCRAP COST BY RESPONSIBILITY—WEEK ENDING APRIL 3, 1937

Responsibility Foreman	Division	*Direct Labor*	*Scrap Cost*	*Unit Scrap Cost Per Dir. Labor Dollar*	*Standard Unit Scrap Cost Per Dir. Labor Dollar*	*Variance From Std. Week End. 4/3/37*	*Variance From Standard Cum. 8/1/36-4/3/37*
	MANUFACTURING DIVISION						
T. Jones	Rubber Mill—Antenna—1141-X	$ 345.45	$ 114.03	$ .33009	$ .50000	$ 58.70	$ —1,586.95
	Rubber Mill—Duprene	6.19	.....	.....	.....	.....	—129.78
	Rubber Mill—Brake Hose	436.71	271.63	.62199	.50000	—53.27	1,776.55
	Compound—Rubber Mill	6,396.85	201.30	.03147	.03400	16.19	—503.64
	Uncured Trimmings—Run. Boards	1,275.71	12.16	.00953	.01000	.60	—516.06
W. Zahn	Running Boards	8,197.37	204.07	.02489	.05000	205.80	1,824.87
	Running Board Inserts	975.37	.74	.00076	.00100	.24	27.26
H. Stevens	Misc. Vulc.: Rubber Metal	2,161.90	70.02	.03239	.10000	146.17	945.61
	Duprene	65.39	53.45	.81740	.48500	—21.74	—915.77
	Soft Rubber	619.84	146.98	.23713	.21000	—16.81	115.25
	Ice Trays	2,250.23	285.73	.12698	.15000	51.80	882.29
	Frig. Lid Body	345.87	25.20	.07286	.05000	—7.91	—1,413.41
	Plating	818.19	65.28	.07978	.09000	8.36	1,013.46
	Stock Preparation	2,156.48	6.28	.00291	.01100	17.44	494.37
	Uncured Trimmings: Rubber Wheel	164.06	54.61	.33287	.40000	11.01	—512.18
	Misc. Parts	2,137.75	211.77	.09906	.10000	2.01	1,108.36
	C. V. Strip—Finish	2,063.69	45.30	.02195	.02917	14.90	9.01
	C. V. Strip—Vulc.	1,187.18	440.57	.37111	.08000	—345.60	—5,525.01
	W. S. Strip—Vulc.	810.94	530.73	.65446	.25000	—328.00	—1,190.19
C. Allen	Misc. Finish	4,069.78	42.24	.01038	.00856	—7.40	—420.14
	Antenna Assembly	466.43	5.30	.01136	.02000	4.03	348.25
H. Kelly	Brake Hose	1,501.07	308.01	.20519	.50000	442.53	2,668.05
V. Tolle	Rubber Wheel	10,269.36	265.15	.02582	.00700	—193.26	—5,637.09
B. Fisher	Machine	6,055.49	120.93	.01997	.02000	.18	501.74
G. Jones	Control Laboratory	54,833.63	133.47	.00243	.00250	3.61	949.54
	Mfg. Div. Not Determined	54,833.63	52.88	.00096	.00150	29.37	962.60
	Misc. Manufacturing	54,833.63	109.97	.00201	.00300	54.53	—1,338.77
	TOTAL MANUFACTURING DIVISION	$ 54,833.63	$ 3,777.80	$ .06889	$ .06700	$—103.95	$ —8,703.25
	Material Division	$ 54,833.63	$ 396.39	$ .00723	$ .00800	$ 42.28	$ —5,074.13
	Engineering Division	54,833.63	—5.12	—.00009	.00120	70.92	—1,257.95
	Sales Division	54,833.63	178.11	.00325	.00198	—69.54	856.81
	Inspection Division	54,833.63	20.45	.00037	.00342	167.08	1,036.62
	Plant Not Determined	54,833.63	157.13	.00287	.00200	—47.46	—4,427.65
TOTAL WEEK ENDING APRIL 3, 1937		$ 54,833.63	$ 4,524.76	$ .08252	$ .08360	$ 59.53	.....
TOTAL CUM. CAR MODEL YEAR 8/1/36-4/3/37		$1,500,226.05	$142,988.44	$ .09531	$ .08360	.....	$—17,569.55

Factory Accounting Dept.

EXHIBIT "E"

April 20, 1937.

To: Mr. Nellis
Mr. Lause

From: E. E. Bollinger

We are following hereunder with the report of the scrap and end jointing performance on the Windshield Strip job for Monday, April 19th, 1937.

O. K. Production	7893
Total Scrap	1241
Pct. of Scrap	15.7%
Rejoints	713
Pct. of Rejoints	9.0%

Cause of Scrap	Quantity Scrapped
Torn	248
Not filled out	549
Bad trim	172
Blisters	76
Joints Vulc. twice and failed	40
Flow lines	16
Blocking Compound	25
Torn posts	20
Kinked	33
Heavy lips	12
Wood in stock	30
Miscellaneous	20
Total	1241

Performance by Part Nos.

Part No.	*O.K.*	*Scrap*	*Pct.*
1088-X	....	26	.....
1145-X	....	63	.....
17108	1350	77	5.7%
17723	125	19	15.2%
17724	2450	95	3.9%
17725	1018	76	7.5%
17747	1450	350	24.1%
17748	1125	380	33.8%
85045	75	3	4.0%
752652	300	152	50.7%
Total	7893	1241	15.7%

Salvage

Part No.	*Quantity*
17108	91
17724	117
17725	1304
85045	617
Total	2129

E. E. Bollinger,
Supervisor of Standards.

By J. H. Ruggles.

EXHIBIT "F"

REPORT OF COMPOUND USAGE ON WHEELS

WEEK ENDING APRIL 3. 1937

Part No.	No. of Wheels Prep.	Temp. Std. Wght. Per Wheel	Total Std. Lbs. Per Whls. Prep.	Net Lbs. Comp. Used On Wheels	Pounds Variance From Std.	Ave. Unit Cost Pound	Cost Variance Wk. End. 4/3/37	Cost Variance Cumulative 8/2/36-4/3/37
500170	3,430	2.875						
750992	27,176	2.594						
751062	105	2.188						
751738	3,761	3.508						
752610	15,601	2.016						
All Wheels Using 6165 Compound.....			125,232	125,136	96	$ .04675	$ 4.49	$ —242.96
All Wheels Using 6286 Compound.....			.....	—52	52	.05310	2.76	—818.66
Mixed Compound Scrapped from Wheel Presses								1.81
					TOTAL COST VARIANCE....		$ 7.25	$—1,059.81

Factory Accounting Department

EXHIBIT "G" 5/27/37

SUMMARY OF MATERIAL USAGE COST VARIANCE FROM STANDARD FOR PERIOD FEBRUARY 28 TO APRIL 3, 1937

	Cost Variance					Total Cost Variance		Val. Mat. At Std.	% of Var. From Std.	Val. Mat. At Std.	% of Var. From Std.
	Wk. End. 3/6/37	Wk. End. 3/13/37	Wk. End. 3/20/37	Wk. End. 3/27/37	Wk. End. 4/3/37	2/28/37-4/3/37	8/2/36-4/3/37	2/28/37-4/3/37	2/28/37-4/3/37	8/2/36-4/3/37	8/2/36-4/3/37
CONTROLLED PRODUCTS SHOWN ON SAVINGS REPORT:											
Running Boards	$ 246.05	$1,048.25	$ 837.81	$ 572.10	$—2.94	$2,701.27	$11,236.36	$174,155.00	1.55%	$ 940,002.00	1.20%
Wheels	—54.01	2.10	—17.37	19.23	7.25	—42.80	—1,059.81	28,718.00	—.15	158,784.00	—.67
C. V. Strips	105.82	114.89	20.13	191.07	173.56	605.47	832.02	55,187.00	1.10	251.704.00	.33
W. S. Strips	360.51	30.48	—100,18	4.41	—30.26	264.96	450.44	35,565.00	.75	241,310.00	.19
Ice Trays and Grids	—4.84	32.27	26.63	47.19	—49.06	52.19	—160.60	28,309.00	.18	119,141.00	—.13
Misc. Products	—93.74	28.92	—160.96	332.60	—92.91	13.91	—296.47	53,816.00	.03	274,919.00	—.11
Antenna	54.13	16.16	.34	—1.14	17.15	86.64	580.70	1,687.00	5.14	43,653.00	1.33
Wheel Paint (Black)	—49.06	58.87	72.42	—97.39	—18.73	—33.89	—2,715.42	4,885.00	—.69	21,423.00	—12.68
Running Board Paint	70.40	64.08	48.28	33.84	—9.02	207.58	—2,007.57	5,701.00	3.64	28,656.00	—7.01
Hyd. Brake Hose	336.19	542.52	474.46	136.91	279.78	1,769.86	3,076.49	21,258.00	8.33	54,607.00	5.63
Rear Compt. Strip	49.49	—94.40	8.44	—53.70	11.68	—78.49	—396.03	14,644.00	—.54	19,321.00	—2.05
Total Variance	$1,020.94	$1,844.14	$1,210.00	$1,185.12	$286.50	$5,546.70	$ 9,540.11	$423,925.00	1.31%	$2,153,520.00	.44%
CONTROLLED PRODUCTS NOT SHOWN ON SAVINGS REPORT:											
Misc. Products	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ —858.62 (A)				
Wheel Paint (Brown)	—62.26	50.83	39.00	—11.66	—43.05	$—27.14	$ —941.77				
Total Variance	—62.26	$ 50.83	$ 39.00	$ 11.66	$—43.05	$—27.14	$—1,800.39				
GRAND TOTAL VARIANCE	$ 958.68	$1,894.97	$1,249.00	$1,173.46	$243.45	$5,519.56	$ 7,739.72				

NOTE: (A) Cost Variance for period 8/2/36-8/15/36 before all Misc. Products were shown on Savings Report.

Factory Accounting Department

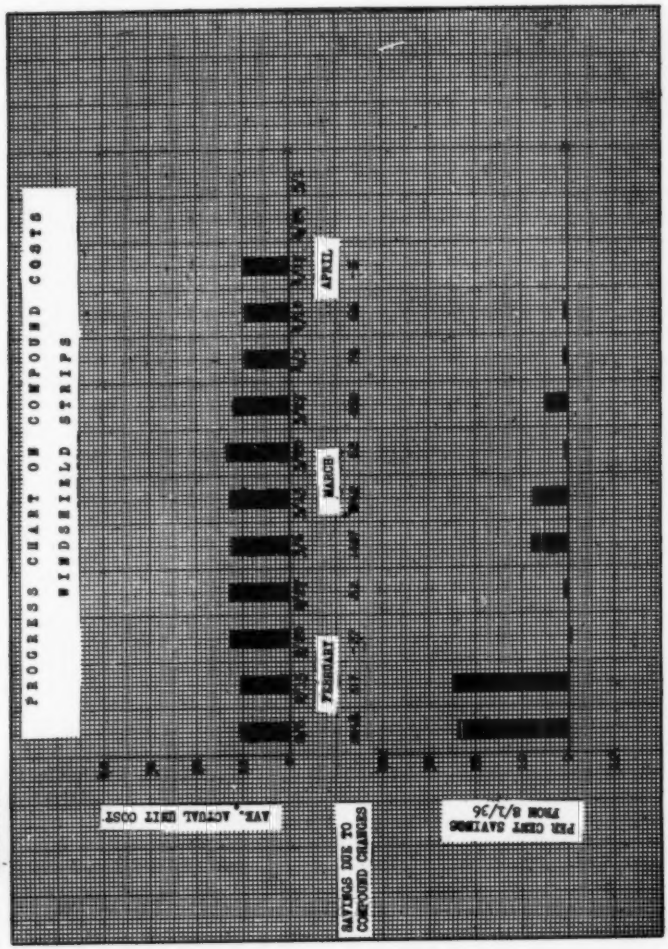


EXHIBIT "A"

-Equity-

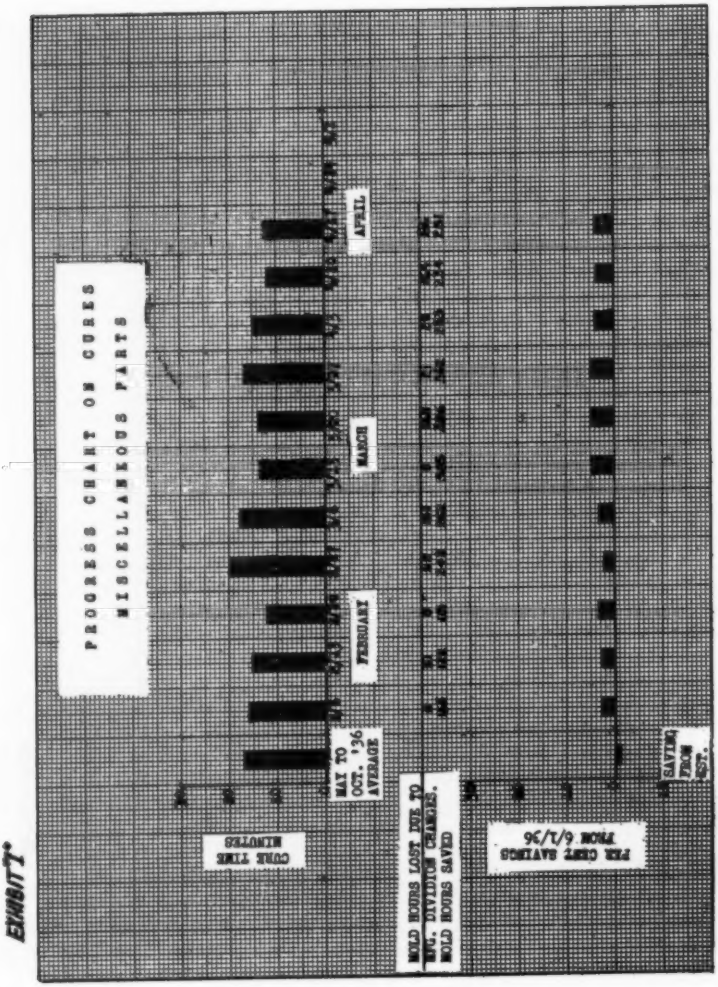
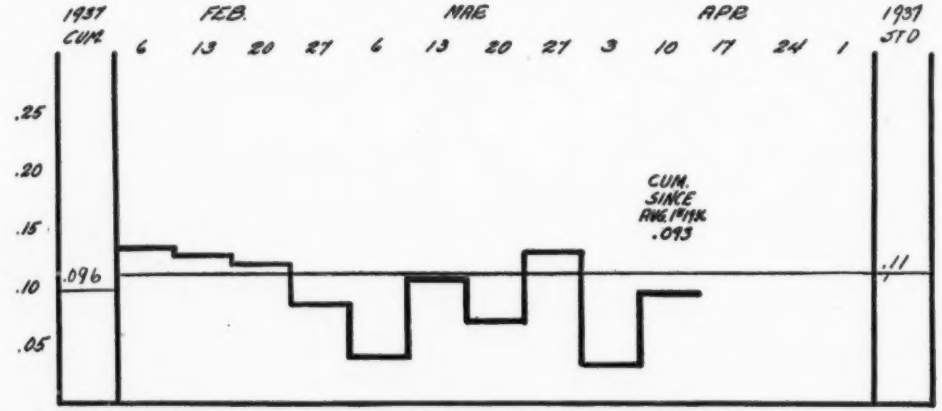


EXHIBIT "A"
PROGRESS CHART ON CORES
MISCELLANEOUS PARTS
CORE TIME
MINUTES
MAY TO
OCT. '36
AVERAGE
FEBRUARY
MARCH
APRIL
MOLD HOURS LOST DUE TO
ENG. DIVISION CHANGES.
MOLD HOURS SAVED
PER CENT SAVINGS
FROM 6/1/36
SAVING
FROM
OCT.

EXHIBIT "J"
MISC. VULC. RUB. METAL
SCRAP & RE-OP COST PER DIRECT LABOR DOLLAR
MR. STEVENS



UNIT SCRAP + RE-OP COST	.131	.126	.119	.084	.089	.107	.069	.129	.092	.094
UNIT SCRAP COST	.126	.126	.119	.084	.089	.107	.069	.129	.092	.094
UNIT RE-OP COST	.005	—	—	—	—	—	—	—	—	

CUM. DOLLARS STD. 7168
CUM. DOLLARS ACTUAL LOSS 8290
CUM. DOLLARS VAR. -EQUALS LOSS 1122

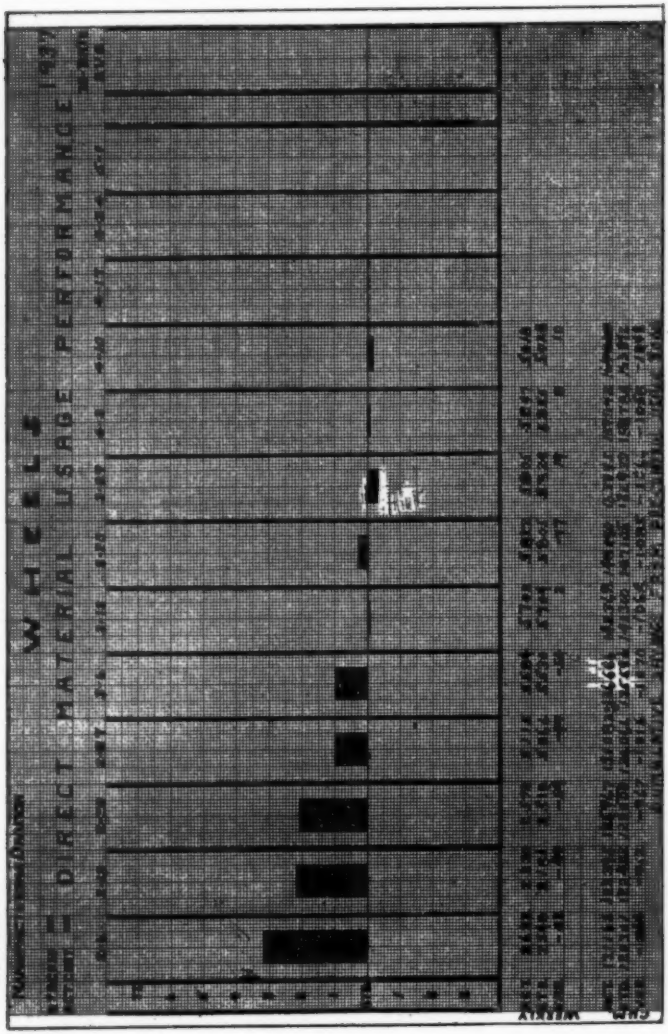


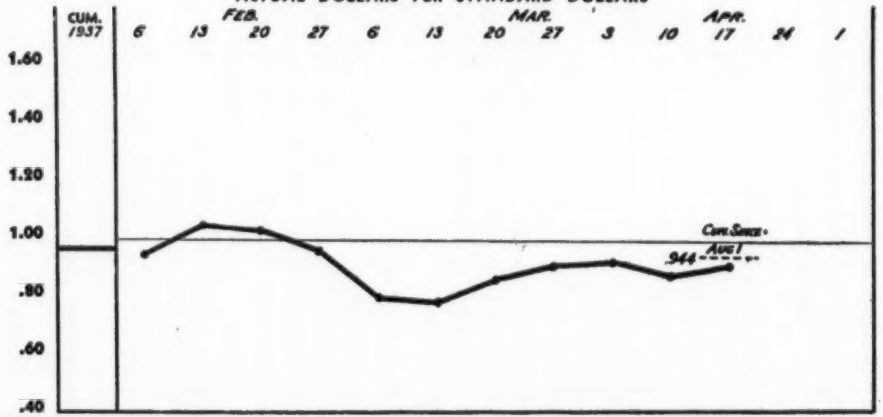
EXHIBIT "X"

EXHIBIT "L"
MANUFACTURING DIVISION

INDIRECT EXPENSE

ACTUAL DOLLARS PER STANDARD DOLLARS

MR. NELLIS



	CUM. 1937	FEB. 6	13	20	27	MAR. 6	13	20	27	APR. 3	10	17	24	1
WEEKLY UNIT		.968	.948	1.055	1.034	.966	.802	.792	.867	.911	.922	.879		.916
ACTUAL DOLLARS	593,720	19,389	19,404	20,304	25,714	25,765	28,645	30,412	31,157	28,842	28,677			32,356
STD. DOLLARS	613,497	20,456	18,395	19,630	27,651	32,140	36,174	35,073	34,231	31,292	32,633			35,333
WEEKLY VAR.		1067	-1009	-674	1937	6375	7529	4661	3044	2450	3956			2976
CUM. VAR.	19,777	20,844	19,385	19,161	21,098	27,473	35,002	39,663	42,707	45,157	49,113			52,089

- EQUALS Loss

ESTIMATING AS A SCIENCE

By J. C. White, Head of Estimating Department,
Inland Manufacturing Division, General Motors Corp.,
Dayton, Ohio

THIS PAPER presents a method of estimating factory costs. These costs are to be used as bases for quoting sales prices on products sold in a competitive market, made to customers' design and specifications and volume requirements. If these requirements be large, the monetary value of slight discrepencies in the estimate will be correspondingly large.

For such a purpose it is essential that estimates be sound. A sound estimate is an exact representation of the lowest average cost that can be maintained in actual production. Estimates must be hastily prepared in order to satisfy customers' impatience and match the competitors' speed. To accomplish this, the following method has been practiced:

Organization and Responsibilities

A decentralized organization is used, allowing each division of the plant to estimate its own responsibilities. The sales department receives the customers' inquiries and supplies the necessary drawings and specifications. After consulting the estimating department, they issue a request to the involved departments for an estimate. The engineering department approves the design of the product, and specifies the type and usage of material. The tool department outlines the process, lists and prices the tools and equipment. The standards department approves the outlined process, and estimates the direct labor cost. The purchasing department prices the material and secures sub-quotations on purchased details.

The estimating department, a section of the Controller's Division, co-ordinates the contributions of the other departments to insure the accomplishment of a sound estimate and fulfillment of the customer's and sales department's requests. It checks the accuracy and reasonableness of the estimated material, process, labor and tools. It applies the burden and summarizes the factory cost. It is also the responsibility of the estimating department to analyze

and justify all the details of the estimate. It must prepare, when necessary, breakdowns and special studies to aid the sales department in determining, explaining and selling their quotation.

A decentralized estimating organization has numerous advantages. Each department, having expressed itself, feels a contracted responsibility to accomplish its part of the estimate if, and when, required. The latest developments, most accurate information and technical knowledge of each department are incorporated in every estimate. The entire plant personnel act as specialized estimating consultants.

On the other hand, in a decentralized estimating organization there is considerable delay and lost time in passing information through several departments, often back and forth. It is difficult to secure complete and accurate transfer of thought progressively through several departments. Information and estimates become distorted and misdirected when handled from person to person. In this type of organization each department is inclined to estimate its own responsibilities conservatively, and hesitates committing itself without ample consideration.

The estimating department must speed up preparation, insure that the contributions of all departments are consistent, and combat the natural conservativeness of each department, if the full advantages of a decentralized estimating organization are to be realized successfully.

Estimating Prerequisites

Estimating is a science if every element of cost is the result of definite causes and deductions which can be, and are, expressed. The science of estimating, as here presented, requires the following factors to be established and available:

1. Complete drawings and specifications of the product are needed. An estimate cannot be expected to represent a true cost of a product, if its true characteristics are unknown. Insufficient details or assumed features will increase estimated costs as the natural protection against doubtful causes of cost.
2. The approximate volume requirements must be known if a sound estimate is to be made. The effect of mass production on costs has often been emphasized. Hence, it would be

illogical to estimate the cost of a product, not knowing how many were to be made.

3. The forecast cost of purchased raw materials must be determined by a study of future commodity markets. This subject involves a question of policy, whether material inventories should be estimated at market value, or cost, or some combination of these two. It is for management to decide if gains or losses on material commitments are to be reflected in estimates.
4. Proper wage rates need to be established for estimating. A progressive consideration of labor costs is to assume that increases in wages will be balanced by improvements in methods and increased efficiency. This is an optimistic assumption in the face of the labor trends of some periods.
5. Sources for quotations on purchased parts must be available if sound prices are to be secured on details or sub-assemblies which would be made outside of the plant. The estimating or purchasing department often is required to estimate what a proper quotation from a supplier would be. Obviously, if the part is to be purchased, it is more reliable to secure quotations from sources most capable of making the part. However, it is well to compare these outside quotations with a detailed estimate as a test of their reasonableness.
6. Available methods, processes and equipment should be understood if the capacities and possibilities of the plant are to be estimated to the best advantage. The latest practical developments in production should be known and incorporated in estimates.
7. A good cost system is the foundation of sound estimating. Cost department records should form the proof of all estimates. Burden rates need to be correctly established for all existing centers. New operations, processes, or departments may require new rates to be determined by cost department studies. An energetic cost control activity is essential if sound estimates are to be met in actual production.

Estimating Standards

If given the above required factors, estimated costs can be well determined by the application of "Estimating Standards." Esti-

mating Standards are established values, indices or methods to be used, with judgment, for predicting any element of the cost of a product. The value of any cost element is influenced by certain characteristics of the product which might be called determinants. Therefore, the cost of a product, which is the sum of its cost elements, is a function of its determinants. If the influence of each of these determinants be known, any combination of these determinants would indicate the cost of the elements and hence the total cost.

Estimating Standards are established by analyzing the elements of cost experienced on products that have been made. By comparing corresponding elements of cost on similar types of products, the determinants and their influence may be realized. The relations found between the determinants and the elements of cost can be averaged and, if judged practical, accepted as Estimating Standards. When a new product is to be estimated, it is classified for each element of cost according to its significant determinants. The standards established for the classification of determinants is a factor with which the cost of the element is computed.

Establishing Estimating Standards

To illustrate the above method of establishing Estimating Standards, we can imagine a labor operation (loading a limited variety of products into a standard container) to consist of four elements; and the time required for each is found to be influenced by a single determinant as follows:

Element	*Determinant — Variations*
1. Prepare Container	Constant for this Operation
2. Obtain Product	Weight: .15 lb, .25 lb, .35 lb
3. Count Product	Equipment: Hand, Scale
4. Load Container	Method: Random, Nested

Analysis of all past time studies on this assumed operation might reveal that the average production rate for every combination of the above variable determinants can be summarized in the following production table of hours per container:

	Random		*Nested*	
Product Weight	*Scale Count*	*Hand Count*	*Scale Count*	*Hand Count*
.15 lb	.04 Hrs.	.10 Hrs.	.08 Hrs.	.15 Hrs.
.25 lb	.06 "	.15 "	.12 "	.20 "
.35 lb	.08 "	.18 "	.14 "	.24 "

Awkwardly shaped products require nesting to conserve space. Products are hand counted when the variation in weight between pieces is too great to use scales accurately.

The packing operation on a proposed product is to be estimated. Consideration of the product shows that it weight .18 pounds, would probably be random packed, and counted by weight. The above chart indicates a standard time of between .04 hours and .06 hours per container. If .05 hours is judged reasonable it may be used as the estimate. If it is known that 45 pounds can be packed in the assumed standard container, it can be computed that 250 pieces weighting .18 pounds each can be loaded in .05 hours or .0002 hours each.

The determinants which influence any labor operation can be classified as:

1. Characteristics of the operation
2. Characteristics of the product
3. Characteristics of the tools, equipment or layout.

A diligent analysis of representative studies on similar operations will usually identify the significant characteristics and the influence of each.

Estimating Standards, if soundly established, refined with experience, and applied with judgment, will improve the speed, accuracy and consistency of estimating. In some plants standards have displaced time studies for setting actual prices on many operations. This same general procedure for establishing Estimating Standards may be used for material or other elements of cost as well as labor operations.

Example

The application of this method of estimating may be illustrated by the following simplified and fictitious example (See Estimate Summary Sheet): Let it be assumed that the cost of a two-inch diameter, solid, red, rubber ball, in quantities of 1,000 daily, is to be estimated by a plant experienced in making varying sizes and colors of rubber balls. The cost is estimated as follows:

FORM 138 REV.

ESTIMATE SUMMARY SHEET

Description: BALL - RED RUBBER
2" Diameter, Solid.

ESTIMATE NO. 1525
PART NO. X-375
CUSTOMER ACE SALES CO.
DATE 6/1/37

	Est. Cost	Act. Cost	Variance
Productive Material .20# @ $.15	03000		
Productive Labor	01050		

DEPT.	DIRECT LABOR	RATE	TOTAL
1 Prepare	00270	200	00540
2 Vulcanize	00460	150	00720
3 Trim	00300	100	00300

Productive Burden	01560		
Scrap 2 % .05610	00112		
Reoperations %			
Special Tool Costs			
Royalty			
Engineering			
Other Charges			
TOTAL MFG. COST	05722		
Shipping Matl. .10 ÷ 250 Pieces	00040		
Shipping Labor	00012		
Shipping Burden	00015		
Total Shipping Cost	00067		
TOTAL FACTORY COST	05789		
Commercial Expense %			
TOTAL COST			
Profit %			
COST PLUS PROFIT			
OUTBOUND FREIGHT—Car Load Allowed			
QUOTATION			

TOOL SUMMARY		
1 Molds 25 Cav.	250	00
Dies		
Fixtures		
Gages		
Misc.		
TOTAL	250	00
Cost of One Mold		
Cap.—This Est.	1,000 Daily	
Cap. of One Mold	1,100 Daily	
Annual Prod.	200,000 Yr.	
Unit Tool Cost	.00125	

REMARKS

SALES DEPARTMENT NOTE: -

1. The above Estimate can be held firm for the Third Quarter only.
2. This Product is 10% more costly than Part No. X-150 now sold to this Customer. This is due to difference in Diameters.
3. The time required to start production on this Product would be two weeks.

MATERIAL

The element of material cost is known to be the product of the two factors, usage and price. Knowing the specific gravity of this red rubber to be 1.20, the net weight of the 2" ball can be computed at .18 pounds. To this net weight must be added process losses or flash and shrinkage. From studies of flash required on similar products actually made, standard flash sizes have been established. A flash groove surrounding the product, 7" long with a cross section of ¼ inch diameter, will add .015 pounds. The usage is the net .18 pounds plus the flash, plus an established 3 per cent stock shrinkage and totals .20 pounds. The price of this red rubber compound, based on ingredient prices established for estimating, is $.15 per pound. Hence, the material cost is .20 pounds @ $.15 — $.03000.

LABOR

Labor in this mythical example is assumed to consist of three operations: preparing, vulcanizing and trimming.

From analysis of all time studies on the operation of preparing rubber for this type of product, the cost determinants are found to be: weight, lot size and type of rubber. For daily requirements of 1,000 pieces, weighing .20 pounds each, in red rubber, the estimating standards show the time required per piece for this operation is .003 hours. At a standard wage rate for this operation of $.90, the unit operation cost is $.00270.

The labor cost of vulcanizing, as found from investigation of actual costs on similar products, is determined by the product diameter and number of cavities in the mold. For this example 25 cavities are required to produce 1,000 pieces daily. The previous analysis of actual costs indicates the labor required for vulcanizing 25 cavities with 2" diameter, is .15 hours, or .006 hours each. At the standard wage rate of $.80 per hours, the cost of this operation is $.00480.

The final labor operation of trimming the flash has been found to depend on the diameter of the ball and the quality of finish. For a 1/32" trim, specified by the engineering department, and a 2" diameter ball, the estimated standard time has been established at

.005 hours, with the prevailing rate of $.60, this operation costs $.00300.

Hence, the total labor cost is $.01050.

Burden

The burden elements depend only on the amount of direct labor estimated in each burden center, and the rates actually established by the cost department for those centers. In this example it is supposed that the rates in per cent of direct labor are 200 per cent, 150 per cent and 100 per cent respectively for the operations of preparing, vulcanizing and trimming. These rates applied to the labor costs estimated above will give a total burden cost of $.01560.

Scrap

The estimated cost of scrap can be determined as a percentage of the total material, labor and burden. The appropriate percentage is estimated by considering the difficulties in the product likely to cause scrap. From studies of actual production it has been found that 2 per cent of this type product are likely to be lost. If it is realized that most of the scrap will occur and be separated before the product is completed, it would be necessary to apply the percentage only to the cost at the time of scrap. Estimating two per cent on the finished cost of this product the cost of scrap is $.00112.

Packing

Packing is estimated by determining the number of pieces that can be loaded in a proper and available container. In this example it might be found that 250 pieces have the proper volume and weight for a standard carton. This sized carton is priced in the stores record at $.09. For the purpose of including outside quotations in this example, we will assume that it is necessary to place a special label on the carton. Design of this label has been sent out to engravers by the purchasing department and quotations of $.01 each have been received. Hence, the total package cost is $.10 for 250 pieces, or a unit packing material cost of $.0040. The standard time established for shipping this size carton is .05 hours or .0002 hours each. At a labor rate of $.60 and a burden of 125

per cent, the labor of $.00012 plus the burden of $.00015 plus the above material of $.00040, gives a total shipping cost of $.00067.

Factory Cost

The total of the above elements is an estimated unit factory cost of $.05789 for this example.

Tools

The tool or mold cost has been found from past experience to depend on the diameter of the product and the number of cavities, as well as the current congestion in the tool industry. Our standards might suggest a cost of $250.00, to be quoted either separately or amortized in the piece price.

Analysis

After the estimate is completed it should be carefully checked for mathematical and clerical accuracy. Each element should be compared to the cost of similar elements in production. The total cost should be considered for reasonableness.

Estimating responsibility does not end with the quotation. If the new product is placed in production, the estimating department should analyze the actual costs. The causes of any variances of actual costs from the estimate should be investigated. Either the actual costs are at fault and should be corrected, or the method of estimating should be improved.

Costs do not always occur according to formula. The many difficulties of adapting cost elements actually experienced to any theoretical correlation have been disregarded in this outline. The detail methods of establishing Estimating Standards will differ for each situation considered. This paper has presented only the general principle of estimating. The costs of a product are influenced by the characteristics of the product. Knowing this influence, and given certain established factors, the cost of any new product may be estimated by proper consideration of those characteristics.

Reserve **JUNE** 20, 21, 22 & 23

For a Topnotch Program—
Control of Industrial Costs

For Presidents' Reception,
Banquet and Costume Party

For Golfing at
Olympia Fields

For Group Luncheons
and Plant Visits

FOR A **NACATION** IN
CHICAGO *"The Nation's Playground"*